70. The modified allergen of claim 37, claim 60, or claim 63, wherein the at least one IgE epitope contains 1 amino acid residue that is modified as compared with the unmodified allergen.

71. The modified allergen of claim 37, claim 60, or claim 63, wherein binding by serum IgE to the at least one epitope is reduced for the modified allergen to less than about 1% of that observed to the unmodified allergen.

Remarks

The Amendment:

Claims 37-59 were examined in the Final Office Action. The present Amendment amends claims 37-42, 46, 47, 51, and 53, cancels claims 54-59, and adds new claims 60-64. This Amendment adds no new subject matter to the application. For example, support for new claims 60-64 can be found on pages 7, 8, and 33 of the application as filed. Furthermore, Applicant specifically reserves the right to pursue the subject matter of the canceled or amended claims in a related application; the present Amendment is introduced for the *sole* purpose of focusing the issues in this case and speeding its progress toward allowance. Applicant respectfully requests reexamination and reconsideration of the present case, as amended.

As required, attached hereto is an Appendix A captioned Version with Markings to show Changes Made and containing a marked-up version of the changes made to the claims by the current Amendment. For the Examiner's convenience, also attached is an Appendix B showing all pending claims remaining in this application after entrance of the present Amendment.

New matter rejections:

The Examiner rejected claims 37-59 under 35 U.S.C. § 112, first paragraph for containing new matter. Applicant respectfully challenges these rejections. In each case, the cited language is fully supported by the specification; in some cases, the language was present in the claims as originally filed. More specifically:

(i) The Examiner asserted that the phrase "except that about 10 to 17% of the amino acids have been modified in at least one IgE epitope" in claims 37 and 38 constituted new matter. Applicant respectfully disagrees. The application contains several examples of modified protein allergen sequences in which about 10-17% of the amino acids in at least one IgE epitope are modified. Nonetheless, in the interest of speeding prosecution of this case toward allowance, Applicant has removed this language from the claims. Claims 37 and 38 now recite "except that at least one amino acid has been modified in at least one IgE epitope". Support for this language can be found, for example, in claim 14 of the application as originally filed.

(ii) The Examiner asserted that the phrase "at least one modified amino acid is located within a central portion of the at least one IgE epitope, the central portion including about 40 % of the amino acids of the at least one IgE epitope" in claim 40 constituted new matter. Applicant respectfully disagrees. The application contains several examples of modified protein allergen sequences in which there is at least one modified amino acid within the central 40% of an IgE epitope. Nonetheless, in the interest of speeding prosecution of this case toward allowance, Applicant has removed this language from the claims. Claim 40 now recites "at least one modified amino acid is located in the center of the at least one IgE epitope". Applicant respectfully submits that this amendment is fully supported by the specification as filed (see, for example page 4, lines 20-23; claims 17 and 18; and the Abstract).

(iii) The Examiner asserted that the phrase "and immune stimulatory oligodeoxynucleotide sequences containing unmethylated CpG motifs which cause brisk activation and skew the immune response to a Th1-type response" in claim 47 constituted new matter. Applicant respectfully disagrees. This language is fully supported by the specification (see, for example, page 7, lines 5-14). Nonetheless, in the interest of speeding prosecution of this case toward allowance, Applicant has removed this language from the claims. Claim 47 has

been amended to recite "and immune stimulatory sequences". This language was present in the claims as originally filed (see claim 24).

(iv) The Examiner asserted that the phrase "natural protein allergen" in claims 37-39, 41-42, 46, and 51-52 is deemed to constituted new matter. Applicant respectfully disagrees. The specification provides significant discussion of a variety of known protein antigens that occur in nature (see, for example, page 7, line 26-page 8, line 16). Nonetheless, in the interest of speeding prosecution of this case toward allowance, Applicant has removed this language from the claims. Claims 37-39, 41-42, 46, and 51-52 have been amended to recite "unmodified protein allergen". This language was present in the claims as originally filed (see, for example, claims 1 and 36).

(v) The Examiner asserted that the phrase "In combination, a natural protein allergen and a masking compound, the masking compound being covalently or non-covalently bound to at least one IgE epitope of the natural protein allergen in such a way that IgE binding is reduced as compared with IgE binding to the natural protein allergen in the absence of the masking compound, wherein the at least one IgE epitope is one that is recognized when the natural protein allergen is contacted with serum IgE in the absence of the masking compound, the serum IgE taken from an individual that is allergic to the natural protein allergen" in claim 54 was new matter. Applicant respectfully disagrees. The specification as filed provides a full discussion of such a natural protein allergen and masking compound (see, for example, page 13, line 3-page 15, line 3). Nonetheless, in the interest of speeding prosecution of this case toward allowance, Applicant has canceled this claim from the application.

(vi) The Examiner asserted that the phrase "the masking compound is an antibody that binds non-covalently to the at least one IgE epitope" in claim 56 is constituted new matter. Applicant respectfully disagrees. The application as filed has significant disclosure of masking antibodies that bind non-covalently to IgE epitopes (see, for example, page 13, line 13-page 15, line 2). Nonetheless, in the interest of speeding prosecution of this case toward allowance, Applicant canceled claim 56 from the application.

Indefiniteness rejections:

The Examiner rejected claims 37-59 on the ground that certain phrases were indefinite. Applicant respectfully traverses the rejections. Specifically:

(i) The Examiner asserted that the phrase "except that about 10 to 17% of the amino acids have been modified in at least one IgE epitope" in claims 37, 38, and 53) was ambiguous and indefinite. Applicant respectfully challenges this assertion. The patent application defines an IgE epitope (see, for example, page 6, lines 16-27), discusses and exemplifies the definition of epitopes in protein allergens (see, for example, page 9, line 16-page 11, line 28; see also Examples 1-4), and refers to literature evidencing that many protein allergen sequences are known, and that many epitopes within protein allergens are known (see, for example, page 7, line 26-page 9, line 15). The application further exemplifies modification of protein allergen sequences within IgE epitopes so that about 10-17% of the amino acids in at least one IgE epitope have been modified (see, for example, Example 2). There is no ambiguity or indefiniteness in this language. Nonetheless, in the interest of speeding prosecution of this case toward allowance, Applicant has removed this language from the claims.

(ii) The Examiner asserted that the phrase "In combination" in claims 45 and 54 renders those claims indefinite and ambiguous. Applicant respectfully traverses the rejection and submits that the phrase clearly indicates that the recited materials are provided together. Nonetheless, in the interests of furthering prosecution of this case toward allowance, Applicant has canceled claim 54 and amended claim 45 to recite "A composition comprising". This rejection can be removed.

(iii) The Examiner asserted that the phrase "in such a way" in claim 54 was deemed indefinite and ambiguous. Applicant respectfully traverses the rejection but notes that it is obviated by the cancellation of claim 54.

Rejection for lack of novelty over US Patent 5,547,669

The Examiner rejected claims 37-46, 48-51, and 53 under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 5,547,669 (the '669 patent). These rejections are respectfully traversed; reconsideration and withdrawal is requested.

The '669 patent teaches methods for preparing "recombitope peptides" and "modified recombitope peptides". In general, "recombitope peptides" are recombinant peptides that include at least two T-cell epitopes derived from the same or from different protein antigens (e.g., see Abstract). The two or more T-cell epitopes are arranged in a *noncontiguous configuration* which is defined as (e.g., see lines 3-8, column 7, emphasis added):

> "an arrangement of amino acids comprising T-cell epitopes [...] which is *different* than that of an amino acid sequence present in the protein [...] from which the epitopes [...] are derived".

"Modified" recombitope peptides are *further* modified by amino acid substitution, deletion, or addition (e.g., see lines 1-20, column 15). By definition, the amino acid sequences of "recombitope peptides" and "modified recombitope peptides" are therefore substantially *different* from those of their parent protein antigens.

In contrast, claim 37 (and claims 38-46, 48-51, and 53 that depend therefrom) relates to a modified protein allergen "whose amino acid sequence is substantially *identical* to that of an unmodified protein allergen *except that* at least one amino acid has been modified in at least one IgE epitope of the unmodified protein allergen". Applicant respectfully submits that the '669 patent does not teach any embodiments according to which a "recombitope peptide" or a "modified recombitope peptide" would have an amino acid sequence that is *substantially identical* to that of an unmodified protein allergen *except that* at least one amino acid has been modified in at least one IgE epitope of the unmodified protein allergen.

Applicant further submits that by teaching methods that involve extracting, rearranging, and optionally mutating T-cell epitopes that were originally present in a natural protein antigen, the '669 patent teaches the generation of wholly artificial polypeptides, whose amino acid sequence differs substantially from that of any natural protein antigen. The '669 patent therefore teaches strongly *away* from modified protein allergens whose amino acid sequence is

substantially identical to that of an unmodified protein allergen *except that* at least one amino acid has been modified in at least one IgE epitope of the unmodified protein allergen, as recited in the present claims.

The '669 patent therefore cannot anticipate or render obvious claims 37-46, 48-51, and 53; the rejection should be withdrawn.

Lack of novelty over US Patent Number 5,449,669

The Examiner rejected claims 54-59 under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 5,449,669. This rejection is mooted by the cancellation of the claims.

Obviousness rejections

The Examiner rejected claims 37, 47, and 52 as being obvious over the '669 patent and either Hoyne et al. (*Immunology and Cell Biology* 74:180-186, 1996) or Burks et al. (*J. Allergy Clin. Immunol.* 93:743-750, 1994). The teachings of the '669 patent and their lackings have been discussed *supra*. Neither of the secondary references is cited for or provides any teaching or suggestion that could overcome the deficiencies in the '669 patent. These rejections can therefore be removed.

Rejection for lack of enablement:

The Examiner rejected claims 37-51 and 53-59 under 35 U.S.C. § 112, first paragraph for lacking enablement. More specifically, the Examiner stated that the specification of the present application does not enable one of ordinary skill in the art to make and use the invention commensurate in scope with claims 37-51 and 53-59. In particular, the Examiner states that there is insufficient enablement for claims to *any* protein allergen modified according to the present invention. In supporting this rejection, the Examiner cites *In re Wands* (858 F2d 731, 737, 8 USPQ2d 1400, 1404 (Fed. Cir. 1988)) and lists the scope of the claim, the amount of direction and guidance provided, the lack of sufficient working examples, the unpredictability in the art and the amount of experimentation as particularly relevant to his rejection.

The levied rejection for lack of enablement was virtually identical to a prior rejection made in the previous Office Action (mailed June 19, 2001) with respect to then-pending claims 14 and 28. Claims 14 and 28 were canceled in Applicant's Response to that Office Action (mailed September 19, 2001); however, in an attempt to further prosecution towards allowance, the "lack of enablement" rejections were addressed with respect to new claims 37-59. Since the Examiner has made no attempt to provide Applicant with any guidance with respect to the persuasiveness of the arguments that were presented in that response, Applicant can only repeat these arguments herein as follows:

Applicant disagrees with the Examiner and submits that claim 37 (and claims 38-51 and 53 that depend therefrom and new claims 60-62) are fully enabled by the specification of the '668 application. Claims 54-59 have been canceled.

As acknowledged by the Examiner, the present specification provides explicit exemplification of modified peanut allergens and methods of preparing them. The specification demonstrates that such modified peanut allergens have reduced IgE binding. Thus, the specification teaches that it is possible to modify an unmodified protein allergen to reduce IgE binding, provides successful evidence of such modification, and gives precise guidance for how to accomplish the modification. While it is true that the examples presented in the specification are peanut allergens, the specification clearly states that its teachings are applicable to other unmodified protein allergens. Those of ordinary skill in the art, having read the present specification, would not require undue experimentation to prepare other modified protein allergens with reduced IgE binding.

The situation in the present case is similar to that described in *In re Wands* (858 F2d 731, (Fed. Cir. 1988)), one of the seminal cases on the enablement standard. In *Wands*, the issue was whether the Wands specification was enabling of claims to *any* antibody having a certain affinity for hepatitis B surface antigen, given that the specification provided examples of only three antibodies. The Court held that the description in the Wands specification was sufficient because, even though many difficult experimental steps (i.e., immunization of animals, isolation of lymphocytes from fused animals, fusion of isolated lymphocytes with myeloma cells,

screening of hybridomas to identify those that make appropriate antibodies, and isolation of such antibodies) are required, those of ordinary skill in the monoclonal art expect to undertake many such steps and "are prepared to screen negative hybridomas in order to find one that makes a desired antibody" (8 USPQ2d 1400, 1407). In essence, once *Wands* demonstrated that high affinity antibodies *could* be obtained, those of ordinary skill in the art could turn the experimental crank with a reasonable expectation that they too would be able to isolate such antibodies.

Similarly, in this case, the inventors have demonstrated that a modified protein allergen with reduced IgE binding *can* be prepared. Those of ordinary skill in the art can now perform the necessary steps (e.g., use patient sera to identify IgE binding epitopes, modify a protein sequence to alter identified IgE binding epitopes; and screen modified proteins to identify those with reduced binding) with a reasonable expectation that they too will be able to obtain modified protein allergens. There is no particular magic in the sequence of an unmodified peanut allergen that makes peanut allergens more susceptible to mutation; the inventive principles, as discussed in the present application, apply to other unmodified protein allergens as well. In fact, quite the opposite might be expected. Peanut proteins are highly allergenic and, like many other food allergens (as distinguished, for example from most pollens and danders) present a significant risk of anaphylaxis to those allergic to them. The inventive demonstration that such anaphylactic food allergen proteins can be modified so that IgE binding is reduced as compared with the unmodified protein provides a strong teaching to those of ordinary skill in the art that other modified protein allergens can also be made.

Lack of written description:

The Examiner rejected claims 37-51 and 53-59 under 35 U.S.C. § 112, first paragraph for lacking written description. In particular, the Examiner stated that the present application does not describe the invention in such a way as to reasonable convey to one of ordinary skill in the art that, at the time that the application was filed, the inventor had possession of to *any* protein allergen modified according to the present invention. In supporting this rejection, the Examiner

cited *University of California v. Eli Lilly and Co.* (119 F3d 1559, 43 USPQ2d 1398 (Fed. Cir. 1997)).

Applicant respectfully traverses this rejection. Claim 37 recites a modified protein allergen whose amino acid sequence is:

(a) substantially identical to that of an unmodified protein allergen except that

(b) at least one amino acid has been modified in at least one IgE epitope so that

(c) IgE binding to the modified protein allergen is reduced as compared with IgE binding to the unmodified protein allergen.

As acknowledged by the Examiner, the present specification provides sufficient written description for claims to modified peanut allergens that fit these limitations. However, the Examiner apparently has taken the position that, because no *sequence* of any non-peanut protein allergen (modified or otherwise) other than a peanut allergen is *explicitly recited* in the specification, the specification does not describe any modified non-peanut protein allergen in such a way that one of ordinary skill in the art would have appreciated that the inventors had *possession* of it. This position is untenable.

Applicant appreciates that certain court decisions, including *U.C. Regents* and, more recently, *Enzo Biochem Inc. v. GenProbe Inc.* (285 F.3d 1013 (Fed. Cir. 2002)) have been interpreted to stand for the proposition that, in certain cases, nucleic acid or protein molecules cannot be properly described in a patent specification without explicit recitation of sequence information. However, this is not such a case. It is important to note that a determination of whether the written description requirement is satisfied requires reading the disclosure in light of the knowledge possessed by those skilled in the art *at the time that the invention was filed* (*In re Alton*, 76 F3d 1168, 37 USPQ 2d 1578 (Fed. Cir. 1996)). In *U.C. Regents*, the patent applications in issue were filed in 1977 and 1979; in *Enzo*, the patent application was filed in 1986. These applications therefore predated the molecular biology revolution, during which reliable strategies for determining nucleic acid sequences, altering them by site directed mutagenesis, and amplifying the generated nucleic acid became routine. As a result of these developments, workers of ordinary skill required much less *explicit* sequence information to

establish possession of a given nucleic acid or protein. The present application was filed on January 6, 2000; its earliest priority date is in 1996, more than ten years *after* the latest application at issue in *Regents* or *Enzo* and almost twenty years after the earliest. The intervening developments in nucleic acid characterization and manipulation were part of the common knowledge of a person of ordinary skill in the at the time the present application was filed. In the context of such knowledge, the present application provides more than enough description of modified protein allergens to demonstrate that the inventors were in possession of the full scope of the now claimed invention.

For example, the specification itself clearly states that its teachings are applicable to other unmodified protein allergens, e.g., protein allergens from foods, insects, molds, dusts, grasses, trees, weeds, mammals, etc. Moreover, the specification also provides thorough written description of:

(a) references that list known amino acid sequences and IgE epitopes for a wide variety of unmodified protein allergens, e.g., allergens from cow milk, egg, codfish, hazel nut, soybean, and shrimp (see, for example, page 7, line 26-page 9, line 15);

(b) identification of IgE binding sites in a selected protein allergen, if they are unknown (see, for example, page 9, line 16-page 11, line 28), coupled with a demonstration that the described strategies are successful when applied to challenging food allergens (see Examples);

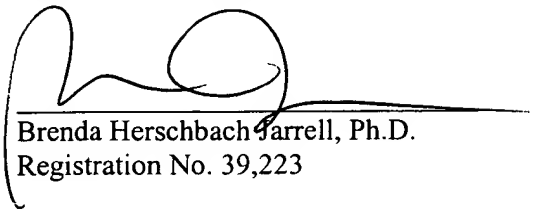
(c) disruption of identified IgE epitopes, coupled with a demonstration that the described strategies are successful when applied to challenging food allergens (see Examples).

These teachings provide more than adequate written description to support the present claims. The rejection for lack of written description should be removed.

Conclusion

Based on the arguments presented above, it is submitted that the pending claims, as amended herein, are allowable over the art of record. If a telephone conversation would help expedite prosecution of this case, please do not hesitate to contact the undersigned at (617) 248-5175. Additionally, please charge any fees that may be required, or credit any overpayment, to our Deposit Account No. 03-1721.

Respectfully submitted,



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Dated: June 18, 2002

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Appendix A:

Version with Markings to show Changes made

In the claims:

Claims 52 and 54-59 have been canceled.

Claims 60-64 have been added.

Claims 37-42, 46, 47, 51, and 53 have been amended as follows:

37. A modified protein allergen whose amino acid sequence is substantially identical to that of an unmodified ~~a natural~~ protein allergen except that at least one amino acid has ~~about 10 to 17 % of the amino acids have~~ been modified in at least one IgE epitope so that IgE binding to the modified protein allergen is reduced as compared with IgE binding to the unmodified ~~natural~~ protein allergen, the at least one IgE epitope being one that is recognized when the unmodified ~~natural~~ protein allergen is contacted with serum IgE from an individual that is allergic to the unmodified ~~natural~~ protein allergen.

38. The modified protein allergen of claim 37 wherein at least one amino acid has ~~about 10 to 17 % of the amino acids have~~ been modified in all the IgE epitopes of the unmodified ~~natural~~ protein allergen.

39. The modified protein allergen of claim 37 wherein the at least one IgE epitope is one that is recognized when the unmodified ~~natural~~ protein allergen is contacted with a pool of sera IgE taken from a group of at least two individuals that are allergic to the unmodified ~~natural~~ protein allergen.

40. The modified protein allergen of claim 37 wherein at least one modified amino acid is located in the center ~~within a central portion~~ of the at least one IgE epitope~~, the central portion including about 40 % of the amino acids of the at least one IgE epitope~~.

41. The modified protein allergen of claim 37 wherein at least one amino acid in the at least one IgE epitope of the unmodified ~~natural~~ protein allergen has been modified by substitution.

42. The modified protein allergen of claim 41 wherein at least one hydrophobic amino acid in the at least one IgE epitope of the unmodified ~~natural~~ protein allergen has been substituted by a neutral or hydrophilic amino acid.

43. The modified protein allergen of claim 37 wherein the modified protein allergen retains the ability to activate T cells.

44. The modified protein allergen of claim 37 wherein the modified protein allergen retains the ability to bind IgG.

45. The modified protein allergen of claim 37 wherein the modified protein allergen retains the ability to initiate a Th1-type response.

46. The modified protein allergen of claim 37 wherein the modified protein allergen is a portion of the unmodified ~~natural~~ protein allergen.

47. A composition comprising ~~In combination,~~ the modified protein allergen of claim 37 and an adjuvant selected from the group consisting of IL-12, IL-16, IL-18, IFNγ, and immune stimulatory ~~oligodeoxynucleotide~~ sequences ~~containing unmethylated CpG motifs which cause brisk activation and skew the immune response to a Th1-type response~~.

48. The modified protein allergen of claim 37 wherein the modified protein allergen is made in a transgenic plant or animal.

49. The modified protein allergen of claim 37 expressed in a recombinant host selected from the group consisting of plants and animals.

50. The modified protein allergen of claim 37 expressed in a recombinant host selected from the group consisting of bacteria, yeast, fungi, and insect cells.

51. The modified protein allergen of claim 37 wherein the unmodified ~~natural~~ protein allergen is obtained from a source selected from the group consisting of legumes, milks, grains, eggs, fish, crustaceans, molluskes, insects, molds, dust, grasses, trees, weeds, mammals, and natural latexes.

53. The modified protein allergen of claim 37 made by the process of:

identifying at least one IgE epitope in an unmodified ~~a natural~~ protein allergen;

preparing at least one modified protein allergen whose amino acid sequence is substantially identical to that of the unmodified ~~a natural~~ protein allergen except, that at least one amino acid has ~~about 10 to 17 % of the amino acids have~~ been modified in the at least one IgE epitope;

screening for IgE binding to the at least one modified protein allergens by contacting the at least one modified protein allergens with serum IgE taken from at least one individual that is allergic to the unmodified ~~natural~~ protein allergen; and

selecting a modified protein allergen with decreased binding to IgE as compared to the unmodified ~~natural~~ protein allergen.

Please add new claims 60-71:

60. A modified food allergen whose amino acid sequence is substantially identical to that of an unmodified food allergen except that at least one amino acid has been modified in at least one IgE epitope so that IgE binding to the modified food allergen is reduced as compared with IgE binding to the unmodified food allergen, the at least one IgE epitope

being one that is recognized when the unmodified food allergen is contacted with serum IgE from an individual that is allergic to the unmodified food allergen.

61. The modified protein allergen of claim 60 wherein the unmodified food allergen is obtained from a source selected from the group consisting of legumes, milks, grains, eggs, fish, crustaceans, and mollusks.

62. The modified protein allergen of claim 61 wherein the unmodified food allergen is obtained from a source selected from the group consisting of wheat, barley, cow milk, egg, codfish, hazel nut, soybean, and shrimp.

63. A modified peanut allergen whose amino acid sequence is substantially identical to that of an unmodified peanut allergen except that at least one amino acid has been modified in at least one IgE epitope so that IgE binding to the modified peanut allergen is reduced as compared with IgE binding to the unmodified food allergen, the at least one IgE epitope being one that is recognized when the unmodified peanut allergen is contacted with serum IgE from an individual that is allergic to the unmodified peanut allergen.

64. The modified peanut allergen of claim 63 wherein the unmodified peanut allergen is selected from the group consisting of Ara h 1, Ara h 2, and Ara h 3.

65. The modified allergen of claim 37, claim 60, or claim 63, wherein the at least one IgE epitope contains 1-6 amino acid residues that are modified as compared with the unmodified allergen.

66. The modified allergen of claim 37, claim 60, or claim 63, wherein the at least one IgE epitope contains 1-5 amino acid residues that are modified as compared with the unmodified allergen.

67. The modified allergen of claim 37, claim 60, or claim 63, wherein the at least one IgE epitope contains 1-4 amino acid residues that are modified as compared with the unmodified allergen.

68. The modified allergen of claim 37, claim 60, or claim 63, wherein the at least one IgE epitope contains 1-3 amino acid residues that are modified as compared with the unmodified allergen.

69. The modified allergen of claim 37, claim 60, or claim 63, wherein the at least one IgE epitope contains 1-2 amino acid residues that are modified as compared with the unmodified allergen.

70. The modified allergen of claim 37, claim 60, or claim 63, wherein the at least one IgE epitope contains 1 amino acid residue that is modified as compared with the unmodified allergen.

71. The modified allergen of claim 37, claim 60, or claim 63, wherein binding by serum IgE to the at least one epitope is reduced for the modified allergen to less than about 1% of that observed to the unmodified allergen.

Appendix B:

Claims Pending After Entrance of Present Amendment

37. A modified protein allergen whose amino acid sequence is substantially identical to that of an unmodified protein allergen except that at least one amino acid has been modified in at least one IgE epitope so that IgE binding to the modified protein allergen is reduced as compared with IgE binding to the unmodified protein allergen, the at least one IgE epitope being one that is recognized when the unmodified protein allergen is contacted with serum IgE from an individual that is allergic to the unmodified protein allergen.

38. The modified protein allergen of claim 37 wherein at least one amino acid has been modified in all the IgE epitopes of the unmodified protein allergen.

39. The modified protein allergen of claim 37 wherein the at least one IgE epitope is one that is recognized when the unmodified protein allergen is contacted with a pool of sera IgE taken from a group of at least two individuals that are allergic to the unmodified protein allergen.

40. The modified protein allergen of claim 37 wherein at least one modified amino acid is located in the center of the at least one IgE epitope.

41. The modified protein allergen of claim 37 wherein at least one amino acid in the at least one IgE epitope of the unmodified protein allergen has been modified by substitution.

42. The modified protein allergen of claim 41 wherein at least one hydrophobic amino acid in the at least one IgE epitope of the unmodified protein allergen has been substituted by a neutral or hydrophilic amino acid.

46. The modified protein allergen of claim 37 wherein the modified protein allergen is a portion of the unmodified protein allergen.

47. A composition comprising the modified protein allergen of claim 37 and an adjuvant selected from the group consisting of IL-12, IL-16, IL-18, IFNγ, and immune stimulatory sequences.

51. The modified protein allergen of claim 37 wherein the unmodified protein allergen is obtained from a source selected from the group consisting of legumes, milks, grains, eggs, fish, crustaceans, mollusks, insects, molds, dust, grasses, trees, weeds, mammals, and natural latexes.

53. The modified protein allergen of claim 37 made by the process of:

identifying at least one IgE epitope in an unmodified protein allergen;

preparing at least one modified protein allergen whose amino acid sequence is substantially identical to that of the unmodified protein allergen except, that at least one amino acid has been modified in the at least one IgE epitope;

screening for IgE binding to the at least one modified protein allergens by contacting the at least one modified protein allergens with serum IgE taken from at least one individual that is allergic to the unmodified protein allergen; and

selecting a modified protein allergen with decreased binding to IgE as compared to the unmodified protein allergen.

60. A modified food allergen whose amino acid sequence is substantially identical to that of an unmodified food allergen except that at least one amino acid has been modified in at least one IgE epitope so that IgE binding to the modified food allergen is reduced as compared with IgE binding to the unmodified food allergen, the at least one IgE epitope

being one that is recognized when the unmodified food allergen is contacted with serum IgE from an individual that is allergic to the unmodified food allergen.

61. The modified protein allergen of claim 60 wherein the unmodified food allergen is obtained from a source selected from the group consisting of legumes, milks, grains, eggs, fish, crustaceans, and mollusks.

62. The modified protein allergen of claim 61 wherein the unmodified food allergen is obtained from a source selected from the group consisting of wheat, barley, cow milk, egg, codfish, hazel nut, soybean, and shrimp.

63. A modified peanut allergen whose amino acid sequence is substantially identical to that of an unmodified peanut allergen except that at least one amino acid has been modified in at least one IgE epitope so that IgE binding to the modified peanut allergen is reduced as compared with IgE binding to the unmodified food allergen, the at least one IgE epitope being one that is recognized when the unmodified peanut allergen is contacted with serum IgE from an individual that is allergic to the unmodified peanut allergen.

64. The modified peanut allergen of claim 63 wherein the unmodified peanut allergen is selected from the group consisting of Ara h 1, Ara h 2, and Ara h 3.

65. The modified allergen of claim 37, claim 60, or claim 63, wherein the at least one IgE epitope contains 1-6 amino acid residues that are modified as compared with the unmodified allergen.

66. The modified allergen of claim 37, claim 60, or claim 63, wherein the at least one IgE epitope contains 1-5 amino acid residues that are modified as compared with the unmodified allergen.

67. The modified allergen of claim 37, claim 60, or claim 63, wherein the at least one IgE epitope contains 1-4 amino acid residues that are modified as compared with the unmodified allergen.

68. The modified allergen of claim 37, claim 60, or claim 63, wherein the at least one IgE epitope contains 1-3 amino acid residues that are modified as compared with the unmodified allergen.

69. The modified allergen of claim 37, claim 60, or claim 63, wherein the at least one IgE epitope contains 1-2 amino acid residues that are modified as compared with the unmodified allergen.

70. The modified allergen of claim 37, claim 60, or claim 63, wherein the at least one IgE epitope contains 1 amino acid residue that is modified as compared with the unmodified allergen.

71. The modified allergen of claim 37, claim 60, or claim 63, wherein binding by serum IgE to the at least one epitope is reduced for the modified allergen to less than about 1% of that observed to the unmodified allergen.